

What is claimed is:

1. A hydrostatic pad for use in holding a workpiece during grinding of the workpiece by grinding wheels, the hydrostatic pad comprising:

5 a body for holding the workpiece during grinding, the body having a working surface area and a horizontal axis;

an opening formed in the body for receiving a first grinding wheel therethrough into engagement with the workpiece; and

10 at least one pocket formed in the body and being adapted for receiving fluid through the body into the pocket for providing a barrier between the body and the workpiece and for applying pressure to the workpiece during grinding, the one pocket having a total pocket surface area of all
15 pockets in the body less than said working surface area of the body such that a ratio of the pocket surface area to the working surface area is less than about 0.26.

2. A hydrostatic pad as set forth in claim 1 wherein the ratio of said pocket surface area to said working surface area is about 0.17.

3. A hydrostatic pad as set forth in claim 1 wherein said pocket surface area is less than about 225 cm² (34.87 in²).

4. A hydrostatic pad as set forth in claim 1 wherein about 20% or less of said pocket surface area is formed below the horizontal axis of the body.

5. A hydrostatic pad as set forth in claim 1 comprising multiple pockets and further comprising drain channels between at least some of the pockets for removing excess fluid from the pockets, each pocket comprising an injection port for
5 introducing fluid from the body into the respective pocket.

6. A hydrostatic pad as set forth in claim 5 wherein the opening in the body has a peripheral edge defined by the body and a center generally corresponding to the axis of rotation of the grinding wheel when received in the opening, the
5 hydrostatic pockets being arranged in radially opposed relation to portions of said peripheral edge and being located a radial distance from the center of said opening.

7. A hydrostatic pad as set forth in claim 6 wherein the opening in the body is formed adjacent a peripheral edge of the body.

8. A hydrostatic pad as set forth in claim 1 in combination with a grinding machine including a first grinding wheel received into the opening of the hydrostatic pad body, a second hydrostatic pad, a second grinding wheel received into
5 an opening of a body of said second hydrostatic pad, wherein the two hydrostatic pads and two grinding wheels are arranged in opposed relation to each other for holding the workpiece therebetween and providing simultaneous double side grinding of the workpiece.

9. A set of semiconductor wafers formed by a single set-up of a double side grinder in a double side grinding process,

each wafer having an improved nanotopology with average peak to valley variations of about 12 nm or less and each wafer
5 being formed by:

positioning the wafer between a first and second hydrostatic pad and between a first and second grinding wheel located within an opening of each of the first hydrostatic pad and second hydrostatic pad; and

10 holding the wafer between said hydrostatic pads and between said grinding wheels so that no appreciable clamping pressure is applied to the held wafer adjacent peripheral edges of the grinding wheels and adjacent peripheral edges of the openings in the pads.

10. A set of semiconductor wafers as set forth in claim 9 wherein the set comprises at least 400 consecutively produced wafers having said improved nanotopology and formed by said single setup.

11. A set of semiconductor wafers as set forth in claim 10 wherein the set comprises at least 800 wafers.

12. A set of semiconductor wafers as set forth in claim 10 wherein each of the wafers in the set are substantially free of center-marks and B-rings.

13. A set of semiconductor wafers as set forth in claim 10 wherein each wafer has an improved nanotopology with average peak to valley variations of about 8 nm or less.

14. A hydrostatic pad for use in holding a workpiece during grinding of the workpiece by grinding wheels, the hydrostatic pad comprising:

5 a body for holding the workpiece during grinding, the body having a working surface area and a center, the body also having a horizontal axis passing through the center;

an opening formed in the body for receiving a first grinding wheel therethrough into engagement with the workpiece, the opening having a peripheral edge defined by the
10 body and further having a center;

at least one pocket formed in the body and being adapted for receiving fluid through the body into the pocket for providing a fluid barrier between the body and the workpiece and for applying pressure to the workpiece during
15 grinding, the one pocket being arranged in radially opposed relation to a portion of the peripheral edge of said opening at a radial distance from the center of said opening; and

a free region formed in the body between the peripheral edge of said opening and the radially opposed one
20 pocket, the free region being constructed so that the hydrostatic pad applies substantially no clamping pressure to the workpiece at the free region when in use.

15. A hydrostatic pad as set forth in claim 14 wherein the free region is recessed from an edge of the one pocket, the pad applying substantially no clamping pressure to the workpiece at the edge of the one pocket, said edge being
5 spaced apart from the peripheral edge of the opening in the body such that the free region is there between.

16. A hydrostatic pad as set forth in claim 15 wherein radial distances from the center of the opening in the pad to different portions of the edge of the one pocket are nonuniform along said edge.

17. A hydrostatic pad as set forth in claim 16 wherein at least one measure of said radial distances is at least about 1.1 times a radius of the opening in the body.

18. A hydrostatic pad as set forth in claim 15 wherein a spacing between a peripheral edge of the grinding wheel when received in the opening in the pad and a radially opposed portion of the pocket edge is nonuniform along said pocket
5 edge and wherein at least one measure of said spacing is at least 0.1 times a radius of the opening in the body.

19. A hydrostatic pad as set forth in claim 14 comprising plural pockets arranged in radially opposed relation to the opening of the body and wherein said free region is formed between the peripheral edge of said opening
5 and at least one of the radially opposed pockets.

20. A hydrostatic pad as set forth in claim 14 further comprising a second body and a second grinding wheel received into an opening of the second body, the two bodies and two grinding wheels being arranged in opposed relation to each
5 other for holding the workpiece therebetween and providing simultaneous double side grinding of the workpiece.